



JSC's Flight Medicine Clinic doctors, nurses and staff help a healthy astronaut corps stay that way. Story on Page 3.



NASA chooses the scientific investigations for a 1990s orbiting system to study the global environment. Story on Page 4.

Space News Roundup

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No. 6

Arctic cold front drops icy blanket on JSC

JSC was covered by a blanket of winter ice early this week that made travel around the center tricky and sometimes hazardous. But by Wednesday, most of the ice had melted and clean-up crews were at work.

Eighteen people were treated at the JSC Clinic for injuries suffered in ice-related falls, according to Beverly Wilson, chief nurse. Most of the injuries occurred Monday, the first day employees were faced with treacherous sidewalks.

Included in those injuries were

one head and neck injury, with a possible skull fracture, two wrist fractures, one shoulder and possible arm fracture, two broken fingers and several back, Wilson said.

Two people were taken by ambulance to St. John Hospital, she said, but none of the injuries was serious or life threatening. Several patients were referred to orthopedic surgeons.

"We were hopping pretty good. It's a different pace for us," Wilson said,

explaining that the increase in minor injuries more than made up for the cancellation of regular appointments because of the weather.

The injuries occurred in spite of sidewalk sanding and salting efforts by Center Operations crews.

Center Operations Director Ken Gilbreath said the biggest weather-related problem was the continued re-icing of ramps, steps and sidewalks. After crews would sand an area Monday, additional freezing rain would quickly render it slippery again,

he said. Salt eventually was added to the sanding mixture in an effort to better combat the ice.

Gilbreath said there was one brief electrical outage Monday afternoon, caused when a power line support tower collapsed in the Webster area. Although JSC's second feed line from the east continued to provide power to the center, the low voltage caused by the loss of the Webster feed line engaged protective breakers in JSC's main electricity distribution center. The breakers caused

a momentary outage that affected computers and electrical equipment throughout JSC.

"We came through the whole siege of bad weather very well," Gilbreath said. "It looks like it has passed us and we're back in good shape."

One interesting difficulty caused by the weather involved the three flag poles in front of Bldg. 1, Gilbreath said. Freezing rain iced over the pulley assemblies used to hoist the flags and prevented the flags

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New computer building opens with fanfare

JSC's new Central Computing Facility was formally opened Thursday with a ribbon-cutting ceremony followed by an all-day exposition featuring the latest in computer hardware and software.

"As a computer facility, this building is going to affect and support every single organization at, supporting or working with the center," JSC Director Aaron Cohen said in a morning ceremony at the new facility, to be designated Bldg. 46.

Cohen reflected on the awesome changes that have taken place in the field of computer technology during JSC's history.

An early "Central Computing Facility" was the first building constructed at JSC, Cohen said, but the nature of computing has changed radically since those earlier days.

"The operation of a computer facility then was primarily one of moving paper," he explained. "We literally had trucks rolling up to the loading dock daily with crates of fresh computing paper, and they carted off the 'computer runs' for delivery to users scattered around the center and the immediate area."

Today, very little paper is involved in computing, he added, and Bldg. 46 will form a hub for technology that is vital to JSC. "It will hold our largest administrative and engineering information systems, as well as systems supporting the development of our critical mission data systems," Cohen said. Virtually every office at JSC is a miniature computer facility of its own, he said.

"All that, coupled via our networks to our laboratories and mainframe systems, form the largest computing resource in the agency and one of the largest in the federal government," Cohen said.

The new, three-story, 66,500-square-foot building will house some new systems, including the super-computer Class 6 Engineering Computation Facility scheduled to begin operations later this year, and many existing major systems to be relocated there. Many of those systems have been jammed into all available space at JSC as they've grown over the years, Cohen said.

"This facility not only signifies the tremendous growth in the use of computer and software technologies in our business, but also the stability and general growth that NASA and the aerospace industry continue to contribute to this area," he added.

Mission Support Director Ron Berry said the computer mainframe that handles most of JSC's electronic mail and central office automation services already has been moved into Bldg. 46.

"That move went without a hitch, and it was excellent practice for the many, many additional moves and installations that face us during the coming year," Berry said.



JSC Photos by Mark Sowa

WINTER WONDERLAND—JSC employees were treated to a beautiful yet treacherous winter landscape this past week as freezing rain and drizzle covered the grounds. The beauty of ice-covered trees, such as the one above at the rocket park, was contrasted by the danger the ice presented for pedestrians, as the sign below attests.



Countdown test goes smoothly; turbopumps out

By James Hartsfield

The high pressure oxidizer turbopumps have been removed from *Discovery's* three main engines at Kennedy Space Center's Launch Pad 39B and replacements are being prepared for shipment and installation.

All operations are on schedule for a launch about March 10-14, Shuttle program director Arnold Aldrich said Monday.

While work was under way on the turbopumps, the STS-29 crew traveled to Kennedy for the Terminal Countdown Demonstration Test (TCDT), or "dry count," a dress rehearsal of launch day. The practice countdown began at 7 a.m. CST Monday and concluded with a simulated T-minus zero at about 10 a.m. on Tuesday. During the test, the crew—Commander Mike Coats, Pilot John Blaha and Mission Specialists Jim Buchli, Bob Springer and Jim Bagian—had a traditional pre-flight breakfast before boarding *Discovery*. Aboard *Discovery*, crew members went through procedures identical to those they will follow on launch day.

At the same time, Rocketdyne technicians were removing the turbopumps from *Discovery's* main engines. The turbopumps are being replaced to prevent development of cracks similar to those found in one

of *Atlantis's* turbopumps following the last mission. The crack was determined to be the result of stress corrosion caused by moisture left in the pumps following assembly.

The drying process used to eliminate moisture was subsequently changed, and new pumps for *Atlantis*

have been assembled using the new method, Aldrich said. The new pumps have arrived at Sten-

nis Space Center and will be hot-fired in tests this weekend before shipment to Kennedy.

STS-29 needs to be launched by March 18 to allow time for the pad to be refurbished for *Atlantis's* April 28 launch to send the Magellan planetary probe to Venus. Positions of the Earth and Venus limit the window during which *Atlantis* can be launched on that mission to 30 days, closing on May 27.

"We believe we have an adequate margin to get STS-29 off before March 18," Aldrich said. All events leading up to launch and connected with the turbopump replacement have proceeded smoothly, he added.

"Our priority is to fly the manifest we've committed to," Aldrich said.

The cost of replacing *Discovery's* and *Atlantis's* turbopumps will not be extensive, he said. Replacing the turbopumps in a vertical position should not be a problem, he added.



STS-29

Clouds help cool Earth, NASA measurements show

The most accurate Earth radiation budget measurements ever made, provided by NASA's Earth Radiation Budget Experiment (ERBE) satellite, confirm that clouds result in a net cooling of the Earth.

Previously, atmospheric scientists were divided on the impact of clouds on the Earth's temperature. The ERBE measurements serve as the baseline for climate modelers to determine whether clouds will partially offset or enhance a future warming of the Earth due to the greenhouse effect, the term given to warming of the Earth's atmosphere and surface by increased concentrations of gases, such as carbon dioxide, methane, nitrous oxide and chlorofluorocarbons.

The major uncertainty in the current ability to assess the future impact of greenhouse gases is the effect of clouds. ERBE has given climate modelers some very specific numbers to test and validate their

models.

At any given time, clouds cover about 60 percent of the Earth. Wispy, high-altitude cirrus (ice) clouds tend to warm the surface. They reflect less solar energy back to space than stratus and cumulus (liquid water) clouds. Because they are so high in the atmosphere, ice clouds also trap more of the infrared heat energy emitted by the Earth and the atmosphere. The net effect of clouds on surface temperatures depends on how these different cloud types are distributed over the globe.

The first of the three ERBE satellites was launched by the Space Shuttle *Challenger* in October 1984. National Oceanic and Atmospheric Administration (NOAA) weather satellites NOAA-9 and NOAA-10 launched in December 1984 and September 1986, respectively, also carried the ERBE instruments. ERBE provided the first opportunity to

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JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays:

FBA membership cards (available to civil service employees and retirees); free. Premium membership (includes Houston Gold C coupon book); \$4 for NASA employees; \$5 for contractors. General Cinema (valid for one year); \$3 each.

AMC Theater (valid until May 31); \$2.95 each.

Sea World (San Antonio, year long); adults, \$17.25; children \$14.75.

Rodeo—The Judds (Feb. 19, 4 p.m., Astrodome); \$8.50.

Rodeo—Crystal Gayle (Feb. 20, 7:45 p.m., Astrodome); \$7.50.

Rodeo—Larry Gatlin (Feb. 24, 7:45 p.m., Astrodome); \$8.50.

Rodeo—Reba McEntire (Feb. 26, 7:45 p.m., Astrodome); \$8.50.

Rodeo—Barbara Mandrel (March 4, 7:45 p.m., Astrodome); \$8.50.

Rodeo—Alabama (March 5, 4 p.m., Astrodome); \$8.50.

Go Texan Rodeo Trip—Charlie Pride (Feb. 25, 3 p.m., Bay Area Park and Ride departure); \$13.

Same Time Next Year (Feb. 17, 8:15 p.m., League City Civic Center Auditorium); \$5.

The Arkansaw Bear (Feb. 18, 7 p.m., Bayou Theatre, UH-CL); \$3.

Pericles, Prince of Tyre (April 22-28, 8 p.m., Satellite Theatre, UHCL); \$4.

Weekend in Galveston (Feb. 25-26, tour on "Colonel" paddlewheeler, "Cabaret" performance, accommodations at Hotel Galvez, Sunday brunch); \$75 per person, double occupancy.

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Dates & Data

Today

Picnic ideas due—The deadline for entries in the 1989 JSC Picnic theme contest is Feb. 10. The winner will receive a \$75 savings bond, a picnic T-shirt and two picnic tickets. Send ideas to Picnic Theme Contest, Sandy Perry, Code FR. For more information, call Perry at x35239.

Information systems conference—Registration deadline for an all-day conference entitled, "Information Systems for Project Management: Coordinating Large, Complex Computing Systems," is Feb. 10. JSC and the University of Houston-Clear Lake will co-sponsor the conference Feb. 22 at the Westin Oaks-Galleria in Houston. Brenda Dervin of Ohio State University will give the keynote speech on "Making Information Systems Work: The Human Dimension." Cost is \$125 per person, or \$100 for university and federal employees. Federal employees should call Glen Van Zandt, x33069, to register. For more information call 488-9433.

Cafeteria menu—Special: barbecue link. Entrees: deviled crabs, broiled codfish, liver and onions. Soup: seafood gumbo. Vegetables: buttered corn, green beans, new potatoes.

Saturday

Softball correction—Registration for spring softball leagues will be Feb. 13-17 at the Rec Center. Sign-up dates for the various leagues were incorrect in the Feb. 3 Roundup. NASA-badged teams will sign up at 7 a.m. each day. The correct sign-up days for the various leagues are: Feb. 13, mixed C and men's D recreational; Feb. 14, men's C; Feb. 15, mixed A and men's B; Feb. 16, mixed B; Feb. 17,

men's A, women's open and Friday special. Non-badged teams will sign up for all leagues at 5:30 p.m. Feb. 17. For more information, call x30304.

Monday

Cafeteria menu—Special: chili and macaroni. Entrees: barbecue sliced beef, Parmesan steak, spare rib with sauerkraut. Soup: French onion. Vegetables: ranch beans, English peas, mustard greens.

Tuesday

Cafeteria menu—Special: corned beef hash. Entrees: meatballs and spaghetti, liver and onions, baked ham with sauce. Soup: split pea. Vegetables: buttered cabbage, cream style corn, whipped potatoes.

Wednesday

Astronomy seminar—The JSC Astronomy Seminar will meet for open discussion at noon Feb. 15 in Bldg. 31, Rm. 193. For more information, call Al Jackson, x33709.

Lunar pole conference—The deadline to register for the March 11-12 Lunar Polar Probe Conference is Feb. 15. The conference at the Nassau Bay Hilton is designed to formalize plans for the development, funding and launch of a small satellite to explore the polar regions of the Moon. The conference is sponsored by the National and Houston Space Societies, Milwaukee Lunar Reclamation Society, University Space Society, New Orleans Space Society, Space Studies Institute, Space Frontier Foundation, ETM Inc. and Third Millennium Inc. Speakers will include Dr. Wendell Mendell of JSC. Registration is \$15, and banquet reservations are \$25. For more information, call 643-6373.

Cafeteria menu—Special: barbecue link. Entrees: cheese enchiladas, roast pork and dressing. Soup: seafood gumbo. Vegetables: pinto beans, Spanish rice, turnip greens.

Thursday

Cafeteria menu—Special: chicken fried steak. Entrees: roast beef with dressing, fried perch, chopped sirloin. Soup: beef and barley. Vegetables: whipped potatoes, peas and carrots, buttered squash.

Feb. 17

AFCEA meets—The next meeting of the Armed Forces Communications and Electronics Association (AFCEA) will be at 11:30 a.m. Feb. 17 at the Nassau Bay Hilton. Texas Sen. J.E. "Buster" Brown will discuss legislative activities of interest to the Clear Lake area. Admission is \$8 for members and \$10 for nonmembers. For more information, call Debbie Williams, 282-4952.

Cafeteria menu—Special: fried chicken. Entrees: fried shrimp, baked fish, beef stroganoff. Soup: seafood gumbo. Vegetables: okra and tomatoes, buttered broccoli, carrots in cream sauce.

Feb. 18

Runners needed—The NASA corporate team is seeking runners in the Conoco 10-kilometer race Feb. 18, or the upcoming Galveston Marathon. For more information, call Luis Rodriguez at x38669, or Mike Evans at x37667.

Gem and mineral show—The Clear Lake Gem and Mineral Society will hold its 14th annual Gem, Mineral and Jewelry Show Feb. 18-19 at the Pasadena Convention Center, 7902 Fairmount Parkway. The show will feature demonstrations of lapidary,

faceting and diamond sawing of rocks. Children will be able to participate in a gem mine and other hands-on projects. Show hours are 9 a.m. to 8 p.m. Feb. 18, and 10 a.m. to 5 p.m. Feb. 19. For more information, call Mack Robinson at x30803.

Feb. 21

ASME meets—The Aerospace Technical chapter of the American Society of Mechanical Engineers (ASME) will meet at 6 p.m. Feb. 21 at the Kings Inn on NASA Road 1. Ronald Kahl of JSC's Lunar and Mars Exploration Office, will present an overview of the Mars Rover Sample Return mission. For more information, call Sam Veerasamy at x31725, or Edward Carter at 333-6791.

Feb. 22

Astronomy seminar—The JSC Astronomy Seminar will meet at noon Feb. 22 in Bldg. 31, Rm. 193. J. Pollock and P. O'Neill will discuss "Radiation Induced Effects on Solid State Devices: the Antarctic Experiment. For more information, call Al Jackson, x33709.

Feb. 23

Quality conference—The second annual South Texas Quality, Productivity and Data Systems Conference, sponsored by the American Society of Quality Control (ASQC) will be Feb. 23-24 at the University of Houston's Hilton Conference Center. For more information, call Eugene Berger, 333-0967.

Feb. 28

BAPCO meets—The next meeting of the Bay Area PC Organization (BAPCO) will be at 7:30 p.m. Feb. 28 at the League City Bank and Trust. For more information, call Earl Rubenstein, x34807, or Ron Waldbillig, 337-5074.

Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2.

Property

Rent: Lake Livingston waterfront, 3-2, fully furnished, covered decks, pier, new cond., wood FPL, ex. fishing, week or weekend. 482-1582.

Sale: Taylor Lake Village/Timber Cove, 2 story, 6-3 1/2-2D, both formals, large country kitchen, breakfast room, oversized family room, FPL, new roof, A/C, gutters, sewer line approx. 2,845 sq. ft., \$120,000. Marcia, x30195 or 326-4320.

Rent: Mobile home lot, \$85/mo., \$50/dep., 4421 4th St. Bacliff and 4102 Kinne, Bacliff. 488-1758.

Sale: Galveston beach house in Pirate's Beach, all appl., fully furnished, \$129,000. 488-0667.

Sale: University Green patio home, 2 plus study/2/2D, 8' brick privacy fence in front and only five blocks from JSC, Jenn-Aire, fans, wet bar, Italian tile, 3 patios, light, bright, and comfortable, \$98,000. Bob, 282-1969.

Sale: Middlebrook, 3-2-2, study, FPL, wet bar, covered patio, large lot, ex. cond., FHA assum. 10%. 480-9363.

Sale: Friendswood/Sun Meadow Estates, wooded lot in estab. neighborhood, cul-de-sac, bordered by stream and golf course on 2 sides, approx. 245' deep and up to 86' wide, util. on site, \$31,500. Doug, x32860 or 486-7412.

Lease: Friendswood/Sun Meadow, 3-2-2D, 1,800 sq. ft., \$600/mo., no pets. 996-9157.

Sale: College Station, 3-1, 3 bks. from A&M campus, \$500/down, assume fixed FHA 9.5%, \$398/mo. 326-1278.

Sale: Heritage Park, 3-2-2 custom home, tile entry, walls of windows in living and dining rooms, beautiful custom kitchen, new deck and fence, both baths redone and vanities custom, new paint inside and out, wallpaper, miniblinds, carpet throughout, \$58,500. Tony or Lori, 482-5139.

Sale: League City, 3-1-1, near Civic Center, fenced yard, \$37,500. x30810 or 488-0597.

Lease: South Bend, 3-2 1/2-2, FPL, fence, clean, gas utility, good location, new paint, \$550/mo. 482-6609.

Lease: Texas City, Gatsby condo across from College of the Mainland, 1 BR large, all appl., \$325/mo. 282-4261 or 554-4974.

Rent: Galveston beach house in Pirate's Beach, all appl., TV, W/D, FPL, \$600/wk. 488-0667.

Sale/Lease: 10 acres on FM 517, 1/2 mile west on Hwy. 146, stocked ponds, barn, util., and more, owner financing avail. 484-7834 or 280-4381.

Cars & Trucks

'78 Honda Civic, 5 spd., good work car, \$500, OBO. 283-6949 or 481-8608.

'86 Chev., S-10 P/U, 38K mi., 4 spd., like new, A/C, camper top, 2 yr. warranty, \$5,500, OBO. Linda, 282-2810 or 480-3909.

'82 Ford F150 XLT Lariat Supercab, new motor under warranty, new tires, shocks, brakes, exhaust, tinted windows, great shape, \$4,750, OBO. 282-6613 or 482-7570.

'29 Mercedes Replica, still in kit, unassembled, Ford frame fits Pinto or Mustang II suspension, retail, \$8,000, was \$6,500, now \$5,500. 484-7834 or 280-4381.

'67 Ford Mustang Classic, 289, V-8, 3 spd., new paint, red, A/C, headers, mags, AM/FM stereo, new exhaust, runs great. \$2,995, OBO. Mike, x38169 or 482-8496.

'88 1/2 Ford EXP, 2 seat, sport hatchback w/moonroof, red/black ground effects, 5 spd., AM/FM stereo/tape, cruise control, tilt steering wheel, rear window defroster, \$6,995. Bill Smith, 282-3504 or 481-5019.

'88 Mustang LX, 2 dr. sedan, blue, P/S, P/W, P/L, A/C, AM/FM tape, cruise control, 2.3 liter, 5 spd., 11,500 mi., \$8,500. Randy, x35459 or 335-1577.

'86 Chrysler Fifth Avenue, fully equip., AM/FM stereo, wire wheel covers, gunmetal metallic, low mi., like new, below NADA, \$10,300. 482-1535.

'85 Chevy S-10 pick-up, extended cab, orig. owner, low mi., AM/FM stereo, dark metallic brown, custom pinstripe and int., Dan Boone Edition, \$2,000/down, take over remaining 16 payments. x33074 or 338-1226.

'67 Dodge Dart, orig. 4 dr., auto., ex. cond. Fred, 488-8111 or 944-0493.

'83 Chevrolet Caprice Classic, one owner, loaded. 930-1509.

'82 Buick Regal, ex. cond., A/C, spoke wheels, V-6, velour int., air shocks, trailer hitch, bronze, AM/FM cass., \$2,950. Bill, x32602 or 326-2326.

'87 Scamper pop-up camper, Model 240C, ex. cond., sleeps 6, opens to 23' 10", queen and double bed plus sofa and table area, ice box, 3 burner butane stove, \$3,125. 280-9073.

Cycles

Honda 185S ATC, garaged, low hours, like new, \$550. Charlie, 488-4412.

Moped, Sears motor bike Model 817.80800. Don, x36769 or 488-4101.

Honda CR125 dirt bike, very good cond., \$250. 474-2200.

'79 Yamaha XS 750 Special, 1 owner, windjammer, AM/FM cass., new tires, lots of extras, \$1,250, OBO. Rich, x34818 or 480-8335.

Boats & Planes

Mistral Bermuda windsurfer, complete rig, ex. for beginners, \$500. 488-6526.

'75 Sea Ray 24' hardtop cruiser, fully equipped for cruising and offshore fishing, \$7,500. Don Holick, 333-3313.

'82 Fisher Marine bass boat, 70hp Mercury, trolling motor, elect. tilt, live well, console, carpet, depth finder, always fresh water and garaged, ex. cond., \$2,900. x38265 or 482-1633.

'88 Bayliner 2455 Ciera Sunbridge, OMC 230 I/O, CB, depthfinder, shore power, full instrumentation, curtains, AC/DC refrig., elec/alcohol stove, twin batteries/auto. charger, trim tabs, presently in water and better than new, \$24,500. Jim, x39872 or 333-4228.

10' Jon boat w/two swivel chairs, \$300. 488-6733.

TRAC 16' catamaran, rolling jib, trapeze,

extras incl., moving, must sell, \$2,500. Randy, x35459 or 335-1577.

10' alum. Jon boat, \$40, OBO. Don, x36769 or 488-4101.

Bic windsurfer, great beginner board, ex. cond., \$350. 474-2200.

Audiovisual & Computers

Atari 800XL computer, \$65. Joel, x39885.

80 character printer stand, table top, three levels, printer on top, incoming paper on bottom, outgoing paper in middle, brand new, never been used, \$35. Bryan, 282-3277.

Pioneer 35 W/L receiver and Panasonic speakers, \$75; Citizen 120D printer, Epson, IBM comp., \$125, OBO. Ken, 282-3468 or 486-7661.

Household

Stearns and Foster traditional convertible fashion queen size hide-a-bed, \$325. Ben, x31588.

Antique hump back steamer trunk, 34L x 21W x 28H, has 95% HDW/trim, \$195; elect. dust collector for furnace, H/P, "Edison", w/pressure switch, 800-1600 CFM, was \$380, now \$150; mirrors, gold-veined (2), 45 x 91 1/2, \$100/ea. Doug, x32860 or 486-7412.

Amana 18 cu. ft. refrig., \$75; 30" gas stove, \$35; 2 piece butcher block counter top w/sink and faucet, \$30; all matching yellow. Pepper, 333-6469 or 337-1337.

Upright freezer, new fan motor, needs thermostat, \$50. Al, x34126 or 421-2830.

Zenith 35-plus year old record player w/AM radio, works perfectly, needs a good cleaning, good conversation piece, \$50. Dan, x39592 or 280-8744.

5 pc. bedroom set, 2 end tables, mirror, dresser, king size headboard, particle wood, dark brown, \$300, OBO. Alan, x32554 or 334-5478.

Quality 3x5 wood and glass dinette w/4 brown chairs, ex. cond. Jerry, 280-2378 or 488-1968.

7 pc. French Provincial antique white w/gold trim girls/teens bedroom furniture, set includes full size headboard, 2-nightstands, dresser, hutch, desk and chair, ex. cond., \$500, OBO. Cathy, x33851 or 996-8835.

Amana 23 cu. ft. upright freezer, works perfectly, \$375, OBO. Anne, 282-4907 or 335-1482.

Queen size waterbed, \$100. John, x35514 or 280-0623.

Sears Kenmore 19 cu. ft. upright frost free freezer, ex. cond., like new, was \$500, now \$275. Tony, 280-1564 or 482-4156.

Sofa, \$300; loveseat, \$200, earthtones; matching oak tables, \$125; brown recliner, \$125; Bentwood rocker, \$25; new full size mattress w/box springs, \$100; refrig. w/ice maker, \$100. Bob, 488-8672.

Chromcraft dinette set, modern executive walnut, 4 diamond tufted chairs, \$225. 482-5274.

Modern inlaid bevel mirrored, glass coffee table and lamp table, \$125; Gilbert antique mantel clock, \$175; tall table lamp, \$25; pair carved unusual large chairs, \$250/ea. or \$450/both. 488-5564.

King size waterbed, heater less than year old, headboard w/mirror, \$100, OBO. 554-4436.

Waterbeds, 1 king size, Hibernation series,

1 queen size, complete w/linens. 930-1509.

Dinette set, metal table, formica top, expansion leaf to adjust from 4 to 6 person, 6 vinyl upholstered metal chairs, \$100, OBO. Julie, x31540 or 482-0833.

Wanted

Want two roommates, non smokers to live in my 3-2 home in Friendswood, cable, W/D, microwave, VCR and all household privileges incl., no dep. or lease to sign, \$225/mo., all bills paid. Mike, x38169 or 482-8496.

Want large size mission operations patch, 9 1/2", "new" design, need at least one, but could use three. Kyle, x38653.

Two or three non smoking riders needed for van pool from West Loop Park and Ride (east of South Post Oak, between N. and S. Braeswood) to NASA area. Richard, x37557.

Looking for anyone who can run IBM ISPF Edit macro from JCL. x37671.

Want van pool riders from Sugar Land or Loop 610 Park and Ride to JSC area. Alice, x35234 or Kam, 282-5163.

Want Apple IIe computer, no peripherals needed; Apple II+ games. Ken Jenks, x34368 or 482-5368.

Pitcher wants to participate in a competitive slow pitch softball team, will play men's or mixed A or B league and consider any night of play. Lanny, 796-1107.

Want a female to carpool from I-45 N. Houston to JSC, hrs. are flexible. Kyrstine, x34172.

Want women to play on a NASA league mixed C recreational softball team. Mark or Todd, 282-3475.

Want roommate to share home in Friendswood, non smoker, \$225, plus 1/2 util. 482-0617.

Want to trade \$8,000 electronic organ for land, car, truck, or boat of equal value, OBO. 337-4051.

Want witness to parking lot accident at Mamacitas between parked car and probable truck/van, accident occurred Friday Jan. 13 at lunchtime. Jonette, x36624.

Photographic

35mm camera, Canon AE-1P (program) w/50mm 1:1.8 lens, new cond., \$200, OBO. Walt, x35939.

Nikon 2020 camera body, near new cond., \$250. (409) 945-7739.

Konica Autoreflex T camera and lens, \$125. also other Konicas and lenses. x30577.

Pets & Livestock

Loving Calico cat needs good home, declawed, affectionate, indoor cat. 333-6216 or 488-1988.

Musical Instruments

Kimball spinet piano, 15 yrs. old, ex. cond., \$900, OBO. Rich, x34818 or 480-8335.

Hammond organ, B-3000 console w/Leslie speaker, very good cond., old time gospel and jazz sound, avail. w/rhythm unit, \$6,000. 482-8262.

Lost & Found

Bicycle missing from Mission Control Center. 332-1473.

Found, black Labrador Jan. 18 in Sterling Knoll/Camino South area. 486-2048.

Miscellaneous

Computer memory, 4164 DRAMs, .95 each; Western suede tan cowhide fringe coat, size 40, like new, \$75; rugcrafters Safari jungle scene rug kit, \$35. 482-5274.

Exercising/workout equip., half price, used 3 times, \$75. 280-8796.

Schwinn Word Sport tour bike, 28" wheels, 36" crossbar, needs new back rim, lightweight frame, ex. for long rides, \$50. Jason, x31872 or 480-1378.

Car mats, front and rear, compact to midsize car, black, carpeted, \$15/set; covered cat litter box, scratching post, food dish, \$15; Mr. Coffee, 10-cup, \$10; weight bench w/leg lift attachment, \$10. Julie, x31540 or 482-0833.

4' high x 175' length fence, encloses 1,500 sq. ft., no rust, 6' posts incl., good dog run, \$100, OBO. 554-4436.

Royal electric long carriage typewriter, hard case, \$95; pedestal fern stand, \$12; sheep skin, nice, \$35. 488-5564.

Ready to fly! R/C airplane (Aerobatic) w/motor (S.T. 60) and radio (Kraft 7 channel - 76 series, \$275. Carlos, x38879 or 554-7727.



Ounce of prevention dear in space age

Flight Medicine Clinic helps healthy astronauts stay that way

By Pam Alloway

An ounce of prevention is worth much more than a pound of cure in the space age, as both physicians and patients in JSC's Flight Medicine Clinic will attest.

Weightlessness has nothing to do with it, either. Astronauts are a different breed of patients. Their careers hinge partly on their ability to stay healthy as they prepare for journeys beyond Earth's boundaries.

"Our focus is preventive medicine, both from our patients' personal and career standpoints," said Dr. Jeff Davis, chief of the Medical Operations Branch that includes the clinic. "Our population is so well screened during astronaut selection, they have few risk factors initially."

NASA flight surgeons' work differs significantly from that of their counterparts in the private sector, said Dr. Richard Jennings, the clinic's chief.

"The tendency in a general practice is to take care of people when they're ill," Jennings said. "Our tendency is toward prevention. We have a very healthy patient population and while the trend toward prevention is in general medicine, it's in flight medicine in particular."

The clinic's staff is comprised of seven flight surgeons, two nurses, one secretary, one medical records technologist, one dentist, and one dental hygienist.

Well schooled in medical practice and procedure, the surgeons and nurses also are familiar with flying regulations—paper and in the air. All seven flight surgeons have private pilot's licenses and their individual flying experience ranges up to 1,500 hours.

"The chief reason physicians seek this field out is they like to fly," Davis said.

Although they have multiple duties, JSC flight surgeons' primary work is in the health care of the astronauts and their families, medical evaluations of astronaut candidates and astronauts for both selection and recertification, and Shuttle support, Jennings said.

Shuttle support includes training flight crews and emergency medical personnel at launch and landing sites, medical certification of payload specialists and Ellington Field pilots and administering the Health Stabilization program.

Flight surgeons analyze on-board experiments to determine what, if any, potential health

hazards the experiment poses and what training the crew must have to deal with those hazards.

A crew surgeon and deputy crew surgeon are assigned to each mission. A third flight surgeon is assigned to Mission Control.

These surgeons begin working with their assigned crews about six months before the scheduled launch date with a two-hour training session on the known medical aspects of space travel.

Two astronauts then are selected as that crew's medical officers and receive about eight additional hours of training. The astronauts become familiar with the contents of the on-board medical kits, and learn diagnostic and treatment methods.

"It's not the Mayo clinic in space but it serves its intended purpose," said Jennings, who is STS-29's crew surgeon.

The primary medical kit, called the Shuttle Orbiter Medical System, weighs 12 pounds. One cubic foot in size, it is composed of the Medication and Bandage Kit and the Emergency Medical Kit. A mission accessory kit that may contain antidotes for specific substances on board.

The "Contaminant Cleanup Kit" recently became a part of the on-board medical supplies, making its debut during STS-26. Astronauts will use its contents—gloves, goggles and surgical masks—if there is a spill, said Jennings.

"Something floating in the air could present real problems in space, particularly if it got in someone's eye," Jennings said. "We've had spills before but having a separate kit to deal with that is something we hadn't thought about before."

Astronauts undergo medical flight examinations annually, 10 days and again two days before the scheduled launch date.

The Health Stabilization Program begins seven days before launch. Anyone who comes in contact with the crew after the program begins must have undergone screening for infectious diseases.

Three days before a launch, the crew surgeon and deputy travel to Kennedy Space Center where they are responsible for the medical care of the crew. Two days before launch, the surgeons give crew members their final examination. On launch day they accompany

the crew to the suit-up room. The deputy then goes to KSC's launch control room and the crew surgeon joins KSC's triage team. Following the launch, the physicians return to JSC.

A few hours before launch, the third flight surgeon joins the Mission Control team and awaits the return of his colleagues. All three physicians then work a rotating schedule throughout the mission until one day before the landing.

On that day, the crew surgeon and deputy fly to Edwards Air Force Base. When the crew lands, the crew surgeon briefly examines the astronauts in the Orbiter, and again at Edwards.

The medical team conducts a final post-flight exam on the crew three days after landing. That exam includes a debriefing with crew members who have brought back, according to Davis, "incredibly detailed descriptions." Those descriptions have pertained to motion sickness, Orbiter habitability, workload, and EVA's, which make valuable additions to the medical data base, Davis said.

Claudette Gage, one of the clinic's nurses who has worked at NASA during all 27 Shuttle missions, assists surgeons in planning for the future of aerospace medicine in general and nursing in particular.

"I believe nurses' presence in space is very far in the future," said Gage, who was one of three JSC recipients of the Federal Business Association's 1988 awards. Gage won in the association's professional-scientific category. "I predict nurses will not be in space until there are lunar bases and space colonization. But there will be ground-based research that will need nurses."

Flight surgeons were among the original staff members at NASA's Houston site. Their duties, however, have changed significantly since the Apollo days when flight surgeons accompanied recovery ships to retrieve astronauts from the South Pacific.

Dr. Charles LaPinta, who has spent the past 25 years working as a flight surgeon in the Manned Test Section, was one of those flight surgeons.

"There was no data back then," LaPinta said, referring to the lack of medical information on human reaction to space travel during the Apollo

era. "At one point NASA officials solicited the opinions of experts in their fields, asking them what they thought would happen to people in space.

"Some said the astronauts would go blind from looking at the darkness of space," LaPinta said. "Others said they would become psychologically unglued. Some said they would suffer severe cardiac arrhythmias and possibly die. Some said they would lose calcium and muscle because of a lack of gravity. That one turned out to be true."

Flight surgeons also have faced the challenge of working with pilots who have invested their lives in their careers and whose careers, in part, hinge on their health.

"They (pilots) want to fly and a flight surgeon is someone who can curtail their career," LaPinta said.

Today's data deals not only with capsules but also with Shuttles and a space station NASA plans to begin operating in the late 1990s.

"Right now flight surgeons take care of well people in a hazardous environment," Jennings said. "That could change with space station if someone is injured or becomes ill... I think there will be more doctors involved with the space program in the future and a lot more crew training including dental care. We're already talking about the possibilities of downlinking some medical tests and data including x-rays in the event of some types of emergencies."

Work on a medical longitudinal study has been under way for some time, Jennings said, but only recently have medical personnel begun transferring the data onto computers and organizing it so it will be more accessible.

Having such information readily available will enable flight surgeons to better track a growing astronaut corps. The number of patients at the clinic has risen from 27 astronauts and their families in 1975 to 97 astronauts plus family members in 1989.

"The numbers have increased, faces have changed," LaPinta said. "There's a lot more work now and it's more complicated. There are different types of payloads that flight surgeons must be familiar with, and they must know more about toxicology. They must know more and do more."



The staff of JSC's Flight Medicine Clinic specializes in caring for patients whose jobs depend on good health: Shuttle astronauts. Top left: Astronaut Michael McCulley demonstrates cardio-pulmonary resuscitation to his daughter, Robin, and wife, Jane, at the clinic. Top right: Dr. Richard Jennings, left, clinic chief and STS-29 crew surgeon, checks the blood pressure of Laura Coats as her father, STS-29 Commander Mike Coats, far right, watches, along with his son, Paul, and wife, Diane. Bottom left: Medical Operations Branch Chief Dr. Jeff Davis, left, advises Astronaut Brian Duffy, his son, Shaun, daughter, Shannon, and wife, Janet, on the benefits of exercise. Bottom right: Claudette Gage, one of two clinic nurses, has worked for all 27 Shuttle missions.



NASA project measures effects of clouds on climate

(Continued from Page 1)
measure the three components of the Earth's radiation balance with identical instruments flying simultaneously on separate satellites.

ERBE's instruments measured solar radiation striking the Earth and reflected by the Earth. The two measurements determine how much solar energy is absorbed by the planet. The absorbed solar radiation heats the Earth's surface. The infrared radiation emitted by the Earth and its atmos-

phere also is measured. This emitted radiation cools the surface of the Earth.

ERBE measurements indicate that in April 1985, clouds reflected back to space considerably more radiation than they trapped in the atmosphere and the surface. This loss is approximately equivalent to a 10 to 30 degrees Fahrenheit decrease in the global surface temperature. Thus, barring changes in any other variables, the Earth would be about 20 degrees warmer without any cloud cover. In

comparison, climate modelers believe that a doubling of carbon dioxide in the atmosphere would result in a warming of about 4 to 8 degrees.

Global warming would change circulation patterns, altering the climates and growing seasons of many regions over the globe. Significant warming also would melt large amounts of ice and snow in the polar regions, increasing the height of the world's oceans. Changes in global circulation patterns would also change

the distribution of clouds over the globe. The ERBE data also revealed for the first time the regional distribution of cloud effects over the globe.

Langley scientists Patrick Minnis and Edwin F. Harrison published the first paper in 1984 showing the regional cloud effects over part of the Earth. They used data from a weather satellite which only observed North and South America. The ERBE satellites viewed all of the Earth with sensors much more accurately than

those normally carried on weather satellites.

ERBE is the first step in NASA's long-term program for studying climate change and is both a national and international effort supported by other government agencies and universities.

The ERBE satellite instruments were developed at Langley and the TRW Corp. ERBE was developed at Goddard Space Flight Center, and Ball Aerospace.

JSC awards contracts for support

JSC has awarded a contract for site support at White Sands Test Facility (WSTF) and is defining a separate contract for information systems acquisition support.

The new WSTF contract has been awarded to Lockheed Engineering and Sciences Co. for site support services and maintenance and operation services.

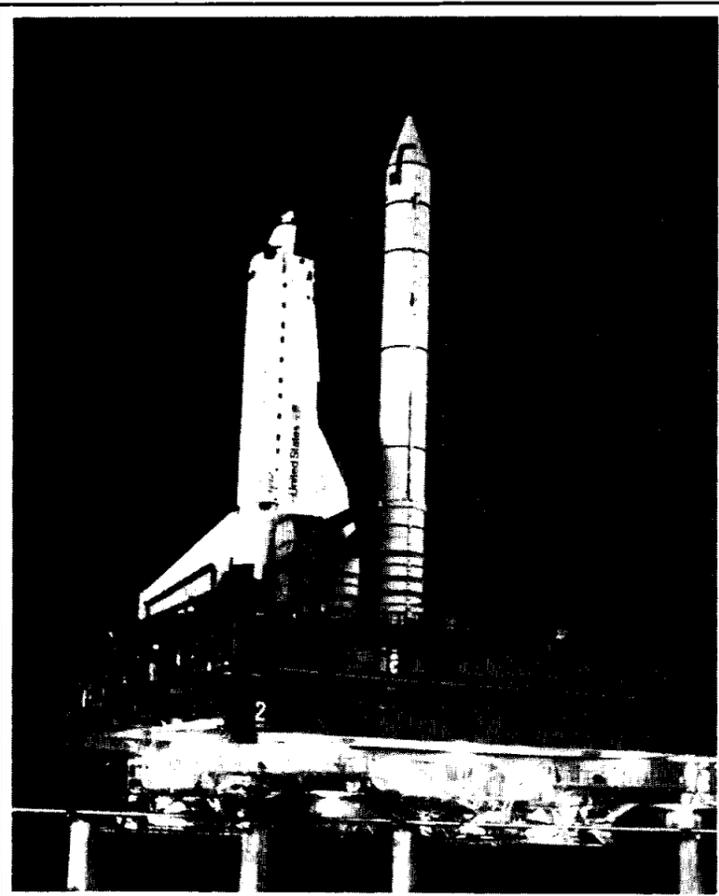
The cost-plus-award fee contract provides for a five-year period of performance, including four negotiated option years, totaling \$171,660,981. The basic year award totals \$31,697,892 with options being \$33,858,425 for the second contract year option, \$34,583,639 for the third, \$35,381,116 for the fourth, and \$36,139,909 for the fifth.

The performance period extends through Jan. 31, 1994.

In separate negotiations, JSC and MITRE Corp. of McClean, Va., are defining a cost-plus-fixed fee contract for information systems acquisition support.

The basic award of \$10,089,600 carries with it four one-year options that, if exercised, will bring the total award to \$55,794,400. The contract also has flexible options that allow for an increase of up to 39,793 hours each year.

The work will be performed in Houston.



PAD CRAWL—The Space Shuttle *Discovery* rolls out to Kennedy Space Center's Launch Pad 39B on Friday. The Tracking and Data Relay Satellite, STS-29's primary payload, later was loaded into the payload bay. Crews are in the process of changing out the high speed liquid oxidizer turbopumps of *Discovery*.

Photo by Frank Bittinger

Facility Development Division will oversee building programs

The Center Operations Directorate announced Tuesday the creation of a new organization called the Facility Development Division to oversee the large and unprecedented JSC building programs anticipated over the next few years.

Center Operations Director Ken Gilbreath said the organizational change includes steps to strengthen the management oversight of the major functions required by the construction of facilities program. Grady McCright, deputy director of Center Operations, will serve as acting division chief for the next few months.

Establishment of the new division, Code JD, will be accompanied by the abolishment of the Facilities Design Division, Code JN. All former personnel of the Facilities Design Division have been transferred to the Facility Development Division.

A Project Design Office has been established to direct and coordinate the studies, designs and specifications required to provide cost-effective, efficient and high quality facilities to support the JSC mission.

E.D. Carter will serve as acting manager of the Project Design Office. A manager will be selected in the

near future.

Three technical discipline offices—the Architectural/Civil, Mechanical Systems and Electrical Systems Offices—have been established to provide engineering support.

A Technical Operations Office will direct efforts associated with the facility utilization needs of the center. E.D. Carter will manage the office, which will be responsible for the management and processing of Facility Work Requests and center-funded projects, technical management of JSC's leased space, and technical management of the Engineering Support Service Contract.

A newly formed Facility Planning Office will provide long-range planning for the center. Gilbreath said much of the credit for recent success in the JSC construction of facilities program goes to advance planning, requirements documentation and advocacy at NASA Headquarters.

The Facility Planning Office, managed by Richard Thompson, is needed to continue this success as the competition between centers and programs for construction funds becomes more intense, he said.

Arctic blast sends chills throughout JSC

(Continued from Page 1)
from being raised Monday. The American flag was raised Tuesday, but it wasn't until Wednesday that all three flags were flying again.

Alan Miyamoto, JSC horticulturist, said it will take about a week to assess whether the ice damaged any of JSC's plants.

"I really don't see any right now," Miyamoto said. "We came out pretty good. It could have been a lot worse."

He said some red oak and ash trees already had buds out because of the unseasonably warm weather that preceded the cold snap. Those trees probably will come out a little later this spring.

The Arctic front that brought the cold weather arrived at nearby Ellington Field, the reporting station closest to JSC, about 3 a.m. Feb. 3, said Steve Sokol of JSC's Spaceflight Meteorology Group.

The temperature dropped from 72 to 53 degrees at Ellington in just an hour, and had reached freezing by 7 p.m. that night, reported Air Force Staff Sgt. Jeff Goldman. The mercury stayed at or below freezing until 9 a.m. Wednesday, a total of 127 hours, Sokol said.

The lowest temperature reported was 25 degrees at 7 p.m. Monday.

While the precipitation came in a form that was troublesome, the amount was not, Sokol said. Only

.06 of an inch of fell Sunday, followed by another .03 of an inch Monday.

At Ellington, the heat failed in Hangar 990 for about three hours on Tuesday and grounded a couple of routine proficiency flights, said Kandy Hosea, a flight management specialist. Most of the T-38 trainers used by the astronauts were at Kennedy Space Center for the Terminal Countdown Demonstration Test.

"All the fields out here look like they've been snowed on because of all the ice," Hosea said Tuesday before the thaw.

At the White Sands Test Facility in New Mexico, snow flurries and

sleet accompanied a low of 18 degrees. The most serious problem was that the hazardous fluids drain line froze, slowing some laboratory operations.

John Allen, deputy chief of the Human Resources Management Branch, said a few employees in far outlying areas were not able to make it to work because of the hazardous driving conditions, but that no widespread absenteeism was reported.

Security Specialist Don Ackerman said there were no reports of weather-related auto accidents on site.

"We should applaud people for their care in driving," Ackerman said.

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Observing system to eye world ecosystem

NASA officials Wednesday announced the selection of scientific investigations for the Earth Observing System (EOS) program, a multi-mission observation system of the 1990s to study global changes taking place in Earth's environment.

EOS is a science mission designed to advance understanding of the entire Earth ecosystem and how it is changing on a global scale through in-depth study of the components of that system and their interactions.

The EOS mission will create an integrated scientific observing system enabling a multi-disciplinary study of planet Earth, including its atmosphere, oceans, land surfaces and the solid Earth. To quantify changes in Earth's system, EOS will be a long-term mission providing systematic, continuing observations from low-Earth orbit.

EOS will make use of a new generation of spacecraft, called polar platforms, being developed as part of

the U.S. Space Station Freedom program. The program is a cooperative effort that may eventually include five platforms—two from the United States, two from Europe and one from Japan—as well as use data from future National Oceanic and Atmospheric Administration operational satellites in polar orbits.

Crucial to achievement of the mission's objectives will be development of the EOS data and information system that will provide access to data acquired by EOS instruments and to scientific results of research using these data.

Investigation selections were based on proposals submitted in response to a January 1988 NASA announcement of opportunity.

Three types of proposals were solicited: instrument investigations for flight on the polar platforms including non-Earth science payloads that require flight in polar orbit research facility instrument team member and

team leader investigations for the six NASA research facility instruments to be flown on the various platforms; and interdisciplinary investigations to provide data analysis and modeling, preparing for and using EOS.

NASA made its selections from 455 proposals that were evaluated by scientific peers including representatives from government, academia, industry and the international Earth-observation community.

The selection breakdown includes 24 instrument investigations, 6 research facility instrument investigation team leaders and 87 team members, and 28 interdisciplinary investigators (20 U.S. and 8 foreign). The various teams selected comprise 551 individuals from 168 institutions, universities or laboratories in 32 states and, including the U.S., 13 countries.

Research facility instrument team members and leaders for the six NASA research facility instruments

were selected. Each of the instruments are planned to fly on one of the polar platforms:

- Atmospheric Infrared Sounder (AIRS)—a system that will measure atmospheric temperature, moisture and other properties as a function of height above the ground with an accuracy and resolution far surpassing current operational satellite instruments.

- Geodynamics Laser Ranging System (GLRS)—a system to study Earth's crustal movements in earthquake-prone regions and across tectonic plate boundaries. GLRS also can measure the surface height profile of glaciers and polar ice sheets to determine how fast they are growing or shrinking.

- High Resolution Imaging Spectrometer (HIRIS)—an imaging spectrometer providing highly programmable, localized measurements of geological, biological and physical processes.

- Laser Atmospheric Wind Sounder (LAWS)—a laser detection and ranging system for direct measurement of tropospheric wind velocities by observing the Doppler shift in light reflected from wind born dust.

- Moderate Resolution Imaging Spectrometer (MODIS)—an imaging spectrometer to measure biological and physical processes in the study of terrestrial, oceanic and atmospheric phenomena.

- Synthetic Aperture Radar (SAR)—an imaging radar that can see through clouds to observe properties relating to the geology, hydrology and ecology of the land, sea ice and ocean waves.

The EOS scientific program is administered by NASA's Office of Space Science and Applications. Goddard Space Flight Center is responsible for the first orbiting polar platform. NASA's Jet Propulsion Laboratory will manage the second orbiting polar platform.